

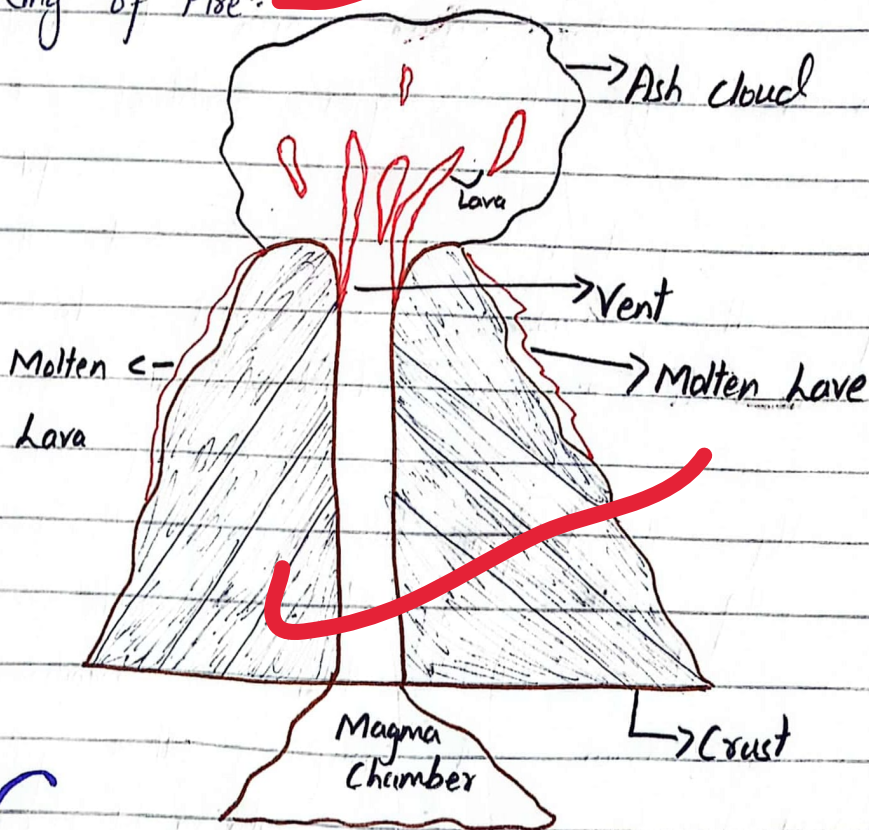
Past-Paper Q: /CSS 2023/

Q: a) What is Volcanic eruption? Discuss its causes and effects.

Introduction

"Volcanic eruption refers to an opening or vent on the earth surface through which molten lava emerge on the surface."

The area around the Pacific Ocean is highly characterized by volcanic activities. The entire rim around Pacific Ocean is known as "Ring of Fire".



Causes

- Inside earth, there is a hot-red liquid known as magma. When magma

magma starts moving towards surface of earth, the gas bubbles in it started to form, which eventually create pressure and cause the explosion in the mountain.

- Due to explosion lava escape on the earth surface.



1) When subducting slab dehydrates, the molten lava emerge on the earth crust.

2) When rifting plates move apart from each other causing the molten lava to escape on the surface.

* Types of Magma causing different Volcanoes:-

1) Thin Magma : If a Magma is thin, then the gas will escape easily from it and did not create pressure in mountain.

Resultantly, there will be no explosion. It come out normally and flow aside.

2) Thick Magma: Thick Magma causes explosion.

As gas will not escape due to thickness. It will create pressure and explodes violently.

Effects of Volcanic Eruption:

- 1) Volcanic Eruption can cause earthquakes.
- 2) Submarine volcanic eruption triggers tsunamis.
- 3) Volcanic eruption emits toxic gases in the atmosphere leading to difficulty in breathing.
- 4) Emission of aerosols, oxides and sulphides lead to acid rain, which causes harm to buildings, crops and affect human life.
- 5) The lava escaped has high temperature of about $1000-1200^{\circ}\text{C}$ affecting the surface and other structures coming its way while flowing.
- 6) Discharge of aerosols impact the filtering capability of atmosphere that filters sun radiations as well as the radiations emit by earth surface. This causes altering of temperature i.e rise in temperature.
- 7) The toxic material release due to volcanic eruption contaminate the water supply bodies as well. Thus it affect human health and water-living organisms.

b) What is Tornado? How it is formed and what are its effects. Explain briefly?

"A localized and violently destructive windstorm occurring over a land characterized by a funnel shaped cloud extended towards a ground".

A Tornado is a violent column of air that extends between earth surface and clouds, usually a cumulonimbus cloud.

- Tornadoes usually last for only 10 to 15 minutes. The largest Tornado can last for about 30 minutes.

- Speed: 40 km/hr \rightarrow 110 km/hr

Majority of Tornadoes occur in USA, North America, South Africa, Philippines and New Zealand. In USA, tornado kills 60-70 persons on average per year.

Formation of Tornado:

Tornadoes are formed by supercell storms, also known as thunderstorm. A supercell storm \sim thunderstorm is characterized by powerful updrafts which help in

tornado formation:

• Rotates in counter-clockwise direction

Moist Warm Air → ← Cold Dry Air

Instability ~ Tornado

Tornado formation follows proper step.

1) Wind Shear is created by differences in wind speed and direction between upper and lower atmosphere.

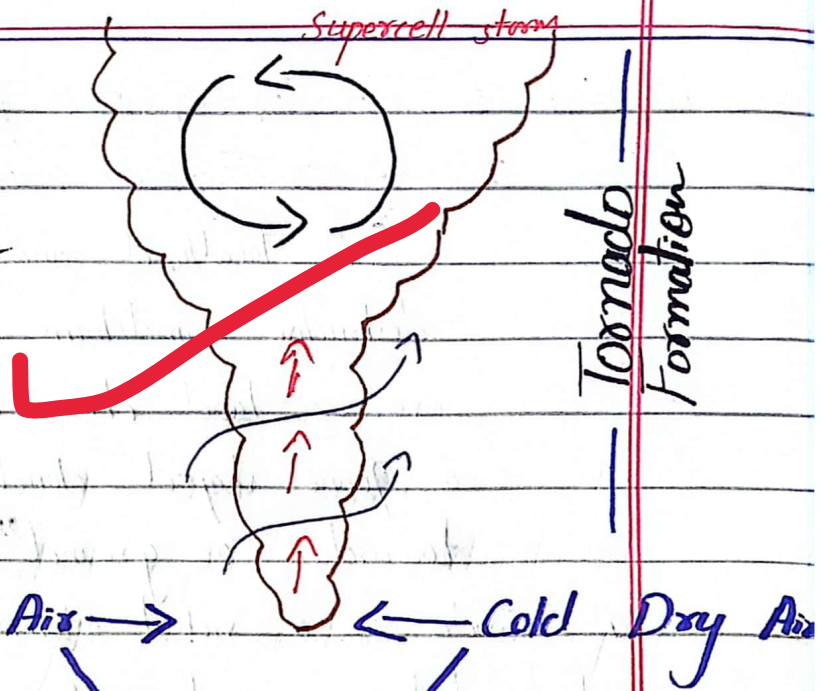
• In upper atmosphere, speed is high

• In lower atmosphere, wind speed is low due to friction near earth surface.

2) Wind shear causes air to spin horizontally in lower atmosphere.

~ horizontal column of air

3) This horizontal spin transform into vertical column of air through the



updrafts (rising air) within thunderstorm.



• A Tornado is formed when Earth funnel connect with Earth Surface

Effects of a Tornado

- Although, Tornado occur for short time periods but they are highly destructive and cause damages.
- Tornado can topple buildings, uplift houses and automobiles.
- The debris flying in atmosphere in form of houses' roofs, furniture, trees with strong force can cause head injuries and deaths as well.
- A intense Tornado can uproot trees from land and can lead to secondary damages.
- Power shortage can occur due to destruction of power supply lines.
- Tornado can cause socio-economic loss depending upon the severity of the damage.
- Post Traumatic Stress Disorder (PTSD) can affect human health.

6) Difference between Renewable and Non-renewable sources of energy. Briefly explain wind energy, solar energy and biofuels.

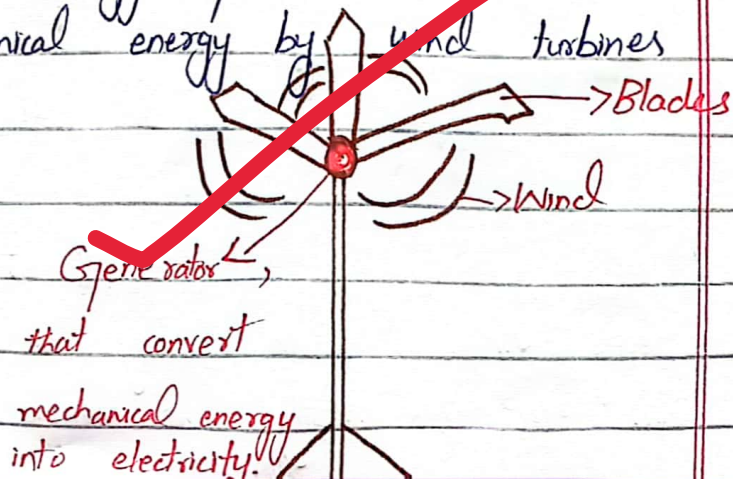
Renewable Energy Sources	Non Renewable Energy Resources
<ul style="list-style-type: none"> • These sources can not be depleted or exhausted by continuous consumption. 	<ul style="list-style-type: none"> • These sources can be depleted or exhausted by their continuous consumption.
<ul style="list-style-type: none"> • They can be replenished naturally on a specific time period. 	<ul style="list-style-type: none"> • They can not be replenished or replaced once depleted.
<ul style="list-style-type: none"> • These are in unlimited quantity. 	<ul style="list-style-type: none"> • These are limited/finite.
<ul style="list-style-type: none"> • Examples \Rightarrow Solar energy, Wind energy, Hydropower 	<ul style="list-style-type: none"> • Examples \Rightarrow Fossil fuels; coal, oil, natural gas etc.
<ul style="list-style-type: none"> • These sources are environmental friendly. They don't cause environmental pollution. 	<ul style="list-style-type: none"> • These sources emit greenhouse gases, i.e. Carbon and leave Carbon foot print. Hence resulting in environmental degradation.

Renewable Energy Sources • Non Renewable Energy Sources

- The availability of these resources depends upon natural cycles and geographical position.
- They are not vulnerable to any kind of geopolitical tensions, as they have continuous and unlimited supply.
- The availability of such sources depends upon geological formation and limited reserves.
- They are vulnerable to geopolitical tensions and conflicts due to competition over their control.

* **Wind Energy:** Wind energy is a renewable energy source. This describes the process by which wind is used to generate electricity.

- The kinetic energy of wind is converted into mechanical energy by wind turbines



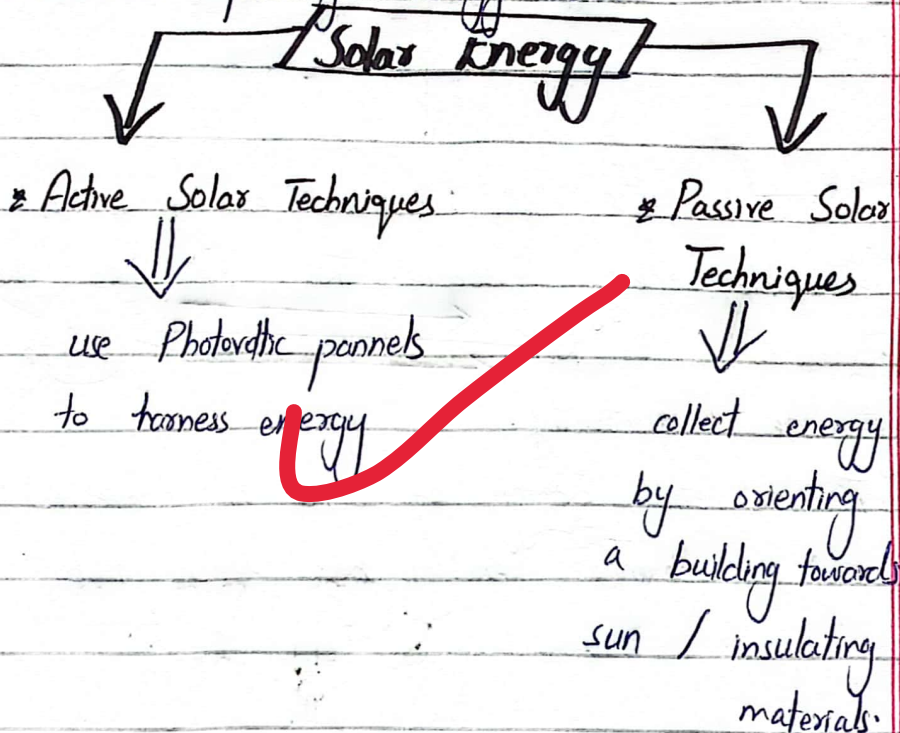
Areas high in altitudes where wind is constant i.e. offshore are preferable for wind turbines.

According to "International Energy Outlook" IEA ~ 2022, wind energy contribute approximately 7% of the world electricity needs.

*

Solar Energy

Solar energy is heat energy obtained from solar radiations of sun, which is an environmental friendly energy source.



- As per 2023 consensus, almost 20 million people in Pakistan rely on solar panel for electricity, mostly in rural areas i.e.

Balochistan and Singh.

Biofuels

- Bioenergy is derived from biofuels.
- Biofuels are fuels derived from organic or inorganic material - biomass - including plant material or animal waste.
- Studies suggest that use of biofuels can reduce greenhouse gases upto 65%.

- Biofuels can be solid, liquid or gaseous. Liquid biofuel is used in transport. Solid biofuel can be used in household such as animal dung is a solid biofuel.

- It can be derived from agricultural crops, fishery products or municipal waste.

As most of biofuel is produced from crops, use of fertilizers on crops can cause air pollution by its consumption.

This is a lengthy answer and will affect your time management. So shorten it a bit

d) Discuss various factors which affect the variations in climate of a place?

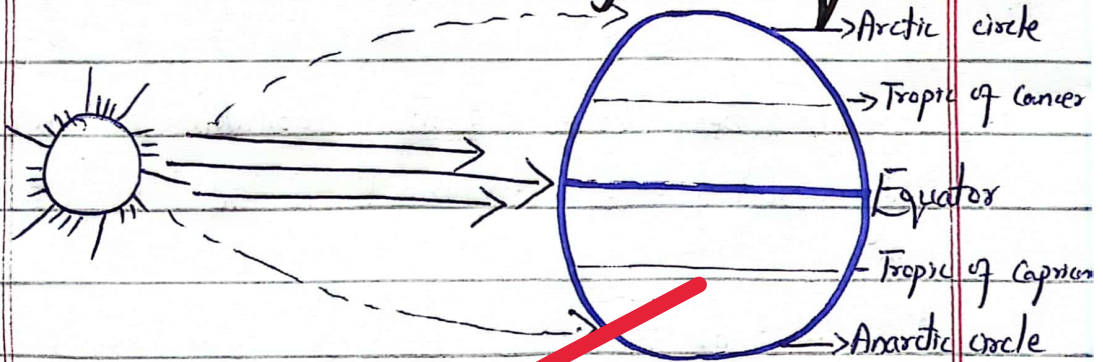
Climate

Climate is the composite or generally prevailing weather conditions such as temperature, air pressure, humidity, precipitation, cloudiness and wind throughout the year.

Factors affecting climate

Different regions have different climatic conditions i.e. differences in temperature, humidity or precipitation. Following are the factors which affect the variations in a climate of a place.

1) Latitude or distance from Equator:



- Places near equator are warmer than places which are away from it i.e. polar regions.
- Sun-rays falls vertically on the equator and slanting in temperate regions.

2) Height from Mean Sea-level

- Temperature decreases with increase in altitude.
 - Mountains are cooler than plains.
 - For a vertical rise of 165 meters, there is an average decrease in temperature at rate of 1°C .
- ⇒ Musree and Quetta cooler than Muttan.

3) Distance from the Sea:

- ⇒ As water is bad conductor of heat. It takes longer time to heat, and more time to cool.
- ⇒ Areas near the coast have low temperature and high humidity due to this moderating effect.
- ⇒ While areas far from sea (interior of the continent) have extreme temperature. They have high range of diurnal temperature.

4) ⇒ Nature of Prevailing Winds:

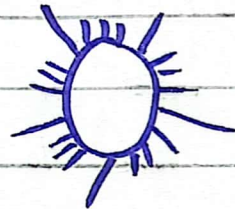
- Onshore winds such as Monsoon bring moisture from sea and cause rainfall in areas where they pass.
- Offshore winds coming from land are dry

and help in evaporation.

5) Slope of Mountains

• Gentler slope = High concentration of heat and warmer the region

• Steep slope = Lesser concentration of heat and lower temperature of the region.



• Southern slope of Himalayas are warmer ~ facing toward sun

• Northern slope cooler than S-slope - away from the sun.

⇒ Hence these factors affects the variations in a climate of a place. Resultantly, the lifestyle of people depends upon these conditions.

Good answers!!!